

REMARKS

The Examiner is thanked for courtesies extended in granting an interview in the above captioned application to Dr. James Baker, employee of the Assignee, and registered patent attorney Dale A. Bjorkman, attorney of record and colleague of the undersigned, on April 14, 2005. During this interview, the history of advances in toner technology, particularly in the use of amphipathic copolymers in toners in the past and in currently pending patent applications, was discussed. The differences between copolymers prepared in aqueous media either as a suspension or emulsion polymerization reactions and amphipathic copolymers prepared in solvents as described in the present application were also discussed. The different development stages and toner discoveries for use in different printing processes were also discussed. Early systems were described having toner particles with very low Tg polymers that were imaged and adhesively transferred by an adhesive overlaminate sheet. Liquid toners, including gels, were also discussed that comprised mid-range Tg toner particles that were formed a film on the photoreceptor and transferred as a film and subsequently fused to a substrate. Phase change developer systems were also discussed, wherein a toner is provided in a system that is solid at room temperature, but which is converted to a liquid toner, for example by heating, prior to imaging. The imaging process in the phase change developer system thus is a liquid toner system.

Issues related to creation of dry toner particles from toner particles prepared in liquids, and issues related to printing from liquid toner compositions without film formation on the photoreceptor were also discussed.

Objections to the specification

The Office Action states that the pending applications should be updated. This has been accomplished by the present amendment.

The Office Action additionally states that trademarks should be capitalized. In review of the specification, it would appear that trademark usage is proper in this application. Specifically, the trademark terms used throughout are capitalized, and they additionally are identified as

trademarks by the TM symbol. It is therefore respectfully submitted that trademark usage is proper in the present application.

Claim Rejections under 35 USC 112

Claims 1, 4, 6, 17, 22, 34, and 41 have been rejected under 35 USC 112, second paragraph as being indefinite as follows:

The Examiner stated that claims 1, 22, and 34 are indefinite in the terms S and D. As suggested by the Examiner, the claims have been amended to relate these terms to the liquid carrier of the organosol from which the dry toner particles are derived.

The Examiner stated that claim 4 is indefinite with respect to the term “visual enhancement additive,” stating that the only type is a pigment particle. This rejection is respectfully traversed. It is respectfully submitted that the full scope of this term would be understood by the skilled worker to include more than a pigment particle. See the specification from page 28, line 23, to page 29, line 20. There, many different kinds of visual enhancement additives are listed. This term also has been frequently used in the prior art (see, e.g. Baker 6,255,363 and Li 5,886,067) as well. Withdrawal of the rejection is respectfully requested.

The Examiner has rejected claim 6 for reciting a Tg of 0°C. It is respectfully noted that claim 6 recites the Tg of the entire amphipathic copolymer. Page 18, line 1 expressly states that the copolymer desirably has a Tg in the range of 0°C to 100°C. The text at Page 18, lines 10 through 27 describes the Tg characteristics of the S and D portions of the copolymer, respectively. The numerical ranges recited in these S and D passages expressly relate to preferred embodiments and thus are consistent with the broad range recited at page 18, line 1. It is also noted that the terminology “at least 0°C” recited at page 18, line 26 would encompass 0°C. Withdrawal of the rejection is respectfully requested.

The Examiner has rejected claims 17 and 41 as teaching “the Hildebrand but on page 12 the Hildebrand can vary.” This rejection is traversed. It is true that the specification teaches that the Hildebrand solubility parameter of the S and D portions may vary over a wide range. However, it is entirely appropriate that dependent claims 17 and 41 recite narrower, more preferred ranges for the Hildebrand solubility parameter of the S portion. Withdrawal of the rejection is respectfully requested.

Claim Rejections under 35 USC 103

Claims 1-19 stand rejected under 35 USC 103 as being unpatentable over Baker (U.S. Pat. No. 6,649,316) in view of Tan (U.S. Pat. No. 5,264,315) and JP 05-119529. The Examiner has stated that it would be obvious to use the binders of either Tan or JP 05-119529 in Baker in order to arrive at the subject matter of the present invention. This rejection is traversed, because the proposed combination does not lead to the claimed invention.

Please note that Applicants have obtained an English language translation of JP 05-119529. A copy of this translation is enclosed. The translation is also cited in the concurrently filed supplemental Information Disclosure Statement. Since JP 05-119529 has already been made of record, it is believed that no fee is due for consideration of the translation.

The claimed invention is significant in providing dry toner particles from an organosol in which the organosol is dried in such a manner so as to yield free-flowing toner particles. This approach is enabled by the present specification which teaches how to remove the liquid carrier of the organosol using fluidized drying techniques and yet maintain separate particles suitable for toner applications. The approach accomplishes drying at suitable temperatures while the organosol is fluidized. Organosols are readily fluidized, and thus are specially compatible with this approach. The resultant dry toner particles have a very tight particle size distribution and are appropriately sized to function as a dry toner without requiring additional comminution or classification.

This is in contrast to many conventional practices in which particles in a liquid carrier have a tendency to agglomerate or aggregate during drying, resulting in masses requiring pulverization and/or classification. See the background of the present specification.

The primary reference Baker U.S. Pat. No. 6,649,316 describes a phase change developer comprising: (a) a carrier having a Kauri-butanol number less than 30; and (b) an organosol comprising a graft (co)polymeric steric stabilizer covalently bonded to a thermoplastic (co)polymeric core that is insoluble in said carrier, and said (co)polymeric steric stabilizer comprises a crystallizing polymeric moiety that independently and reversibly crystallizes at or above 30°C, wherein said phase change developer has a melting point at or above 22°C.

As noted in the Baker '316 specification beginning at column 11, line 52, the term "phase change developer" has an accepted meaning within the imaging art. As the term indicates, the developer system is present as one physical phase under storage conditions (e.g., usually a solid) and transitions into another phase during development (usually a liquid phase), usually under the influence of heat or other directed energy sources. Thus, in the system as described in Baker '316, the toner is converted from a solid form to a liquid form prior to development, so that the toner as described first is in the solid form, and then through a specific manipulation is converted to liquid form under image formation conditions so that the actual image formation process is carried out in the form of a liquid. See column 2, lines 21-25.

There are significant differences between Baker '316 and the present claims. It is a claimed feature of the present claims that the Tg of the S portion(s) is lower than the Tg of the D portion(s). In Baker, Tg characteristics are the other way around. There, the Tg of the S portion is higher than that of the D portion to help ensure rapid self-fixing. See col. 8, lines 20-32.

Neither Tan nor JP 05-119529 cures the deficiencies of Baker. Neither Tan nor JP 05-119529 describes an amphipathic copolymer as claimed. It is true that JP 05-119529 does describe a graft copolymer. However, there are many different types of graft copolymers, and not all have S and D portions as claimed. Indeed, the graft copolymer of JP 05-119529 does not. JP 05-119529 describes an approach in which emulsion polymerization is used. All of the monomers used by JP 05-119529 are soluble in the organic phase. This is a homogeneous polymerization that necessarily lacks the combination of S and D portions as claimed. As an additional deficiency, JP 05-119529 also necessarily fails to teach or suggest the claimed relationship between the Tg of the S and D portions.

Thus, even if one were to use the graft copolymer of JP 05-119529 in the Baker phase change developer, the resultant combination would lack an amphipathic copolymer as claimed.

Tan also fails to teach an amphipathic copolymer having S and D portions as claimed. It is true that Tan involves oil in water polymerization to produce particles having a core/shell structure. However, this is not accomplished using an amphipathic copolymer. Instead, Tan uses, in practical effect, two classes of monomers. First, one class is used to form a shell generally at the interfacial boundary between the dispersed oil phase and the surrounding aqueous phase. The result is encapsulated droplets. Then, the polymerizable material in the

encapsulated droplets is polymerized to form a core. Clearly, the core and shell components of Tan are not derived from an amphipathic copolymer having S and D portions as claimed. As an additional deficiency, Tan also necessarily fails to teach or suggest the claimed relationship between the Tg of the S and D portions.

Thus, even if one were to use the shell/core particles of Tan in the Baker phase change developer, the resultant combination would lack an amphipathic copolymer as claimed.

In view of these remarks, withdrawal of the rejection of claims 1-19 over the proposed combination of Baker with Tan and JP 05-119529 is respectfully requested.

Claims 20-53 stand rejected over Baker (U.S. Pat. No. 6,649,316) in view of Ogawa (U.S. Pat. No. 6,136,490). The Examiner stated, in practical effect, that it would be obvious to use the organosol of Baker in the Ogawa method to arrive at the subject matter of Claims 20-53. This rejection is traversed because the proposed combination is improper and even if made does not lead to the claimed invention.

Claims 20-53 relate to a method of making a dried toner from an organosol comprising an amphipathic copolymer dispersed in a liquid carrier. The organosol is dried while in a fluidized state to provide free flowing dry toner particles. The use of fluidized drying techniques to obtain dry toner particles from an organosol comprising an amphipathic copolymer is not taught or suggested by the cited documents.

Ogawa prepares toner particles using suspension polymerization techniques in which fine oil phase droplets are dispersed in an aqueous medium. This is not an organosol. Ogawa also fails to teach fluidized drying.

It is respectfully submitted that combining Baker with Ogawa is improper, in that each document teaches such a different approach that it is not readily obvious or apparent to one skilled in the art how to substitute the organosol of Baker into the oil in water emulsion processing context of Ogawa. Neither reference teaches adequately how this might be accomplished successfully in any event without significant experimentation to attempt to make it work. The amphipathic copolymer of the organosol of Baker would have soluble and insoluble portions in the oil phase of Ogawa. How would this impact shelf stability and fixability, two important objectives? Could particle size still be controlled? Could particles of very tight size

distribution still be grown successfully using amphipathic monomers? Will pigment be dispersed appropriately? Are the Tg characteristics of the Baker amphipathic copolymer consistent with the performance objectives of Ogawa? Can the resultant amphipathic particles of Baker, if dispersed in an oil phase in an aqueous medium still be dried without undue agglomeration and aggregation? Baker does not teach how to use its organosol in an oil in water polymerization context such as that of Ogawa, and Ogawa nowhere teaches how to handle the phase change developer organosol of Baker in its oil in water polymerization process either.

And, if Baker were to be substituted for the entirety of the Ogawa process, that would undermine and destroy the essential character of Ogawa and leave the skilled worker with naught but Baker itself.

In short, Baker and Ogawa represent two vastly different schemes for making developers and toners. Baker uses an organosol approach to make phase change developers. Ogawa uses oil in water emulsion polymerization techniques to make dry toner. It is not readily seen how the organosol of Baker could be readily inserted into the Ogawa process with any reasonable expectation of success.

Even if somehow the Baker organosol were to be substituted into the Ogawa process, the claims would still not be met. The resultant combination would still be a method involving oil in water polymerization, not an organosol approach as claimed. Additionally, neither document teaches using an amphipathic copolymer having the S and D Tg characteristics as claimed, so the combination would lack these features.

Withdrawal of the rejection of Claims 20-53 over Baker and Ogawa is respectfully requested.

Double Patenting

The Examiner has provisionally rejected Claims 1-53 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-24 of co-pending Application No. 10/612535 in view of Baker (U.S. Pat. No. 6,649,316).

Please note that co-pending Application No. 10/612535 is commonly owned with the present application. Enclosed herewith please find a Terminal Disclaimer to overcome this rejection.

CONCLUSION

In view of the above remarks, it is respectfully submitted that the claims and the present application are now in condition for allowance. Approval of the application and allowance of the claims is earnestly solicited. In the event that a phone conference between the Examiner and the Applicant's undersigned attorney would help resolve any remaining issues in the application, the Examiner is invited to contact said attorney at (651) 275-9804.

Respectfully Submitted,

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